CLAIMS

What is claimed is:

1. A circuit board, comprising:

(a) a section of circuit board material;

(b) operating circuitry mounted to the section of circuit board material, the operating circuitry being configured to receive a set of soft start power signals in a particular sequence when transitioning from a startup state to a normal operating state; and

(c) a converter system that includes:

(i) a first circuit having:

(A) a first converter that is configured to provide a first soft start power signal to the operating circuitry, and

(B) a first controller, coupled to the first converter, that is configured to provide a first control signal indicating whether the first converter properly provides the first soft start power signal;

(ii) a second circuit having:

(A) a second converter that is configured to provide a second soft start power signal to the operating circuitry, and

(B) a second controller, coupled to the second converter, that is configured to provide a second control signal indicating whether the second converter properly provides the second soft start power signal; and

(iii) an interconnection mechanism which is configured to electrically connect the first controller of the first circuit with the second controller of the second circuit, wherein the first controller is

configured to disable the first converter when the second control signal indicates that the second converter improperly provides the second soft start power signal, and wherein the second controller is configured to disable the second converter when the first control signal indicates that the first converter improperly provides the first soft start power signal.

2. The circuit board of claim 1 wherein the interconnection mechanism of the converter system is a conductive pathway, wherein the first controller includes (i) a first output circuit that electrically connects with the conductive pathway to provide the first control signal on the conductive pathway and (ii) a first sensor that electrically connects with the conductive pathway, and wherein the second controller includes (i) a second output circuit that electrically connects with the conductive pathway to provide the second control signal on the conductive pathway and (ii) a second sensor that electrically connects with the conductive pathway.

3. The circuit board of claim 2 wherein the conductive pathway of the interconnection mechanism includes:

a switch;

a first conductor having a first end that electrically connects with the first output circuit and the first sensor, and a second end that electrically connects with the switch; and

a second conductor having a first end that electrically connects with the second output circuit and the second sensor, and a second end that electrically connects with the switch.

4. The circuit board of claim 1 wherein the first controller is further configured to provide a first current indication signal which is proportional to a value of current of the first soft start power signal; wherein the second controller is further configured to provide a second current indication signal which is proportional to a value of current of the second soft start power signal; wherein the first controller is configured to direct the first converter to provide the first soft start power signal based on the second current indication signal provided by the second controller; and wherein the second controller is configured to direct the second converter to provide the second soft start power signal based on the first current indication signal provided by the first controller.

5. The circuit board of claim 1 wherein the first converter includes:

(i) first switched capacitor circuitry that electrically connects with a voltage reference and a ground reference in an alternating manner to provide the first soft start power signal to the operating circuitry, the first soft start power signal having a first output voltage value that is between a voltage reference value of the voltage reference and a ground reference value of the ground reference,

(ii) a first overvoltage protection switch interconnected between the first switched capacitor circuitry and the voltage reference, and

(iii) a first control circuit coupled to the first switched capacitor circuitry and the first overvoltage protection switch, the first control circuit being configured to open the first overvoltage protection switch when the first output voltage value exceeds a first predetermined threshold; and

wherein the second converter includes:

(i) second switched capacitor circuitry that electrically connects with the voltage reference and the ground reference in an alternating manner to provide the second soft start power signal to the operating circuitry, the second soft start power signal having a second output voltage value that is between the voltage reference value of the voltage reference and the ground reference value of the ground reference,

(ii) a second overvoltage protection switch interconnected between the second switched capacitor circuitry and the voltage reference, and

(iii) a second control circuit coupled to the second switched capacitor circuitry and the second overvoltage protection switch, the second control circuit being configured to open the second overvoltage protection switch when the second output voltage value exceeds a second predetermined threshold.

6. The circuit board of claim 1 wherein the first circuit further includes a control register, and wherein the first controller is further configured to selectively direct the first converter to provide (i) the first soft start power signal with a regulated voltage value regardless of a value of an input power signal when the control register stores a first control value, and (ii) the first soft start power signal with a margined voltage value based on the value of the input power signal when the control register stores a second control value that is different than the first control value.

7. A converter system, comprising:

(a) a first circuit having:

(i) a first converter that is configured to provide a first soft start power signal, and

(ii) a first controller, coupled to the first converter, that is configured to provide a first control signal indicating whether the first converter properly provides the first soft start power signal;

(b) a second circuit having:

(i) a second converter that is configured to provide a second soft start power signal, and

(ii) a second controller, coupled to the second converter, that is configured to provide a second control signal indicating whether the second converter properly provides the second soft start power signal; and

(c) an interconnection mechanism which is configured to electrically connect the first controller of the first circuit with the second controller of the second circuit, wherein the first controller is configured to disable the first converter when the second control signal indicates that the second converter improperly provides the second soft start power signal, and wherein the second controller is configured to disable the second converter when the first control signal indicates that the first converter improperly provides the first soft start power signal.

8. The converter system of claim 7 wherein the interconnection mechanism is a conductive pathway, wherein the first controller includes (i) a first output circuit that electrically connects with the conductive pathway to provide the first control signal on the conductive pathway and (ii) a first sensor that electrically connects with the conductive pathway, and wherein the second controller includes (i) a second output circuit that electrically connects with the conductive pathway to provide the second control signal on the conductive pathway and (ii) a second sensor that electrically connects with the conductive pathway.

9. The converter system of claim 8 wherein the conductive pathway includes:

a switch;

a first conductor having a first end that electrically connects with the first output circuit and the first sensor, and a second end that electrically connects with the switch; and

a second conductor having a first end that electrically connects with the second output circuit and the second sensor, and a second end that electrically connects with the switch.

10. The converter system of claim 7 wherein the first controller is further configured to provide a first current indication signal which is proportional to a value of current of the first soft start power signal; wherein the second controller is further configured to provide a second current indication signal which is proportional to a value of current of the second soft start power signal; wherein the first controller is configured to direct the first converter to provide the first soft start power signal based on the second current indication signal provided by the second controller; and wherein the second controller is configured to direct the second converter to provide the second soft start power signal based on the first current indication signal provided by the first controller.

11. The converter system of claim 7 wherein the first converter includes:

(i) first switched capacitor circuitry that electrically connects with a voltage reference and a ground reference in an alternating manner to provide the first soft start power signal to the operating circuitry, the first soft start power signal having a first output voltage value that is between a voltage reference value of the voltage reference and a ground reference value of the ground reference,

(ii) a first overvoltage protection switch interconnected between the first switched capacitor circuitry and the voltage reference, and

(iii) a first control circuit coupled to the first switched capacitor circuitry and the first overvoltage protection switch, the first control circuit being configured to open the first overvoltage protection switch when the first output voltage value exceeds a first predetermined threshold; and

wherein the second converter includes:

(i) second switched capacitor circuitry that electrically connects with the voltage reference and the ground reference in an alternating manner to provide the second soft start power signal to the operating circuitry, the second soft start power signal having a second output voltage value that is between the voltage reference value of the voltage reference and the ground reference value of the ground reference,

(ii) a second overvoltage protection switch interconnected between the second switched capacitor circuitry and the voltage reference, and

(iii) a second control circuit coupled to the second switched capacitor circuitry and the second overvoltage protection switch, the second control circuit being configured to open the second overvoltage protection switch when the second output voltage value exceeds a second predetermined threshold.

12. The converter system of claim 7 wherein the first circuit further includes a control register, and wherein the first controller is further configured to selectively direct the first converter to provide (i) the first soft start power signal with a regulated voltage value regardless of a value of an input power signal when the control register stores a first control value, and (ii) the first soft start power signal with a margined voltage value based on the value of the input power signal when the control register stores a second control value that is different than the first control value.

13. A method for providing a set of soft start power signals to operating circuitry mounted on a circuit board, the method comprising the steps of:

enabling a first converter to provide a first soft start power signal to the operating circuitry and a second converter to provide a second soft start power signal to the operation circuitry;

providing a first control signal that indicates whether the first converter properly provides the first soft start power signal;

providing a second control signal that indicates whether the second converter properly provides the second soft start power signal; and

disabling the first converter if the second control signal indicates that the second converter improperly provides the second soft start power signal, and disabling the second converter if the first control signal indicates that the first converter improperly provides the first soft start power signal.

14. The method of claim 13 wherein the step of providing the first control signal includes the step of applying the first control signal to a conductive pathway; wherein the step of providing the second control signal includes the step of applying the second control signal to the conductive pathway; and wherein the method further comprises the step of:

sensing the conductive pathway to determine whether either any of the first converter improperly provides the first soft start power signal and the second converter improperly provides the second soft start power signal.

15. The method of claim 14, further comprising the step of:

providing a disconnection in the conductive pathway to prevent further disabling of the first converter if the second control signal indicates that the second converter improperly provides the second soft start power signal, and further disabling of the second converter if the first control signal indicates that the first converter improperly provides the first soft start power signal.

16. The method of claim 13, further comprising the steps of:

providing a first current indication signal which is proportional to a value of current of the first soft start power signal;

providing a second current indication signal which is proportional to a value of current of the second soft start power signal; and

directing the first converter to adjust the first soft start power signal based on the second current indication signal provided by the second controller, and directing the second converter to adjust the second soft start power signal based on the first current indication signal provided by the first controller.

17. The method of claim 13 wherein the step of enabling includes the steps of:

electrically connecting a first power storage device with a voltage reference and a ground reference in an alternating manner to provide the first soft start power signal having a first output voltage value that is between a voltage reference value of the voltage reference and a ground reference value of the ground reference;

comparing the first output voltage value of the first soft start power signal to a first predetermined threshold;

opening a first overvoltage protection switch interconnected between the first power storage device and the voltage reference when the first output voltage value exceeds the first predetermined threshold;

electrically connecting a second power storage device with the voltage reference and the ground reference in an alternating manner to provide the second soft start power signal having a second output voltage value that is between the voltage reference value of the voltage reference and the ground reference value of the ground reference;

comparing the second output voltage value of the second soft start power signal to a second predetermined threshold; and

opening a second overvoltage protection switch interconnected between the second power storage device and the voltage reference when the second output voltage value exceeds the second predetermined threshold.

18. The method of claim 13, further comprising the step of:

storing one of a first control value and a second control value that is different than the first control value in a control register; and

wherein the step of enabling includes the step of:

providing the first soft start power signal, the first soft start power signal having (i) a regulated voltage value regardless of a value of an input power signal when the control register stores the first control value, and (ii) a margined voltage value based on the value of the input power signal when the control register stores the second control value that is different than the first control value.

19. A circuit board, comprising:

(a) a section of circuit board material;

(b) operating circuitry mounted to the section of circuit board material, the operating circuitry being configured to receive a set of power signals; and

(c) a converter system that includes:

(i) a first circuit having:

(A) a first converter that is configured to provide a first power signal to the operating circuitry, and

(B) a first controller, coupled to the first converter, that is configured to provide a first current indication signal which is proportional to a value of current of the first power signal;

(ii) a second circuit having:

(A) a second converter that is configured to provide a second power signal to the operating circuitry, and

(B) a second controller, coupled to the second converter, that is configured to provide a second current indication signal which is proportional to a value of current of the second power signal; and

(iii) an interconnection mechanism which is configured to electrically connect the first controller of the first circuit with the second controller of the second circuit, wherein the first controller is configured to direct the first converter to provide the first power signal based on the second current indication signal provided by the second controller, and wherein the second controller is configured to direct the second converter to provide the second power signal based on the first current indication signal provided by the first controller.

20. The circuit board of claim 19 wherein the first controller is configured to operate in one of a master mode and a slave mode based upon a first comparison between the first current indication signal and the second current indication signal; and wherein the second controller is configured to operate in the other of the master mode and the slave mode based upon a second comparison between the first current indication signal and the second current indication signal.

21. The circuit board of claim 19 wherein the first controller includes a first power MOSFET device to sense the value of the current of the first power signal, and wherein the second controller includes a second power MOSFET device to sense the value of the current of the second power signal.

22. A converter system, comprising:

(a) a first circuit having:

(i) a first converter that is configured to provide a first power signal, and

(ii) a first controller, coupled to the first converter, that is configured to provide a first current indication signal which is proportional to a value of current of the first power signal;

(b) a second circuit having:

(i) a second converter that is configured to provide a second power signal, and

(ii) a second controller, coupled to the second converter, that is configured to provide a second current indication signal which is proportional to a value of current of the second power signal; and

(c) an interconnection mechanism which is configured to electrically connect the first controller of the first circuit with the second controller of the second circuit, wherein the first controller is configured to direct the first converter to provide the first power signal based on the second current indication signal provided by the second controller, and wherein the second controller is configured to direct the second converter to provide the second power signal based on the first current indication signal provided by the first controller.

23. The converter system of claim 22 wherein the first controller is configured to operate in one of a master mode and a slave mode based upon a first comparison between the first current indication signal and the second current indication signal; and wherein the second controller is configured to operate in the other of the master mode and the slave mode based upon a second comparison between the first current indication signal and the second current indication signal.

24. The converter system of claim 22 wherein the first controller includes a first power MOSFET device to sense the value of the current of the first power signal, and wherein the second controller includes a second power MOSFET device to sense the value of the current of the second power signal.

25. A method for providing a set of power signals to operating circuitry mounted on a circuit board, the method comprising the steps of:

enabling a first converter to provide a first power signal to the operating circuitry and a second converter to provide a second power signal to the operation circuitry;

providing a first current indication signal which is proportional to a value of current of the first power signal;

providing a second current indication signal which is proportional to a value of current of the second power signal; and

directing the first converter to adjust the first power signal based on the second current indication signal provided by the second controller, and directing the second converter to adjust the second power signal based on the first current indication signal provided by the first controller.

26. The method of claim 25 wherein the step of directing the first converter and directing the second converter includes the steps of:

running the first converter in one of a master mode and a slave mode based on a first comparison between the first current indication signal and the second current indication signal; and

running the second converter in the other of the master mode and the slave mode based on a second comparison between the first current indication signal and the second current indication signal.

27. The method of claim 25 wherein the step of directing the first converter and directing the second converter includes the steps of:

sensing the value of the current of the first power signal from a first power MOSFET device coupled to the first converter; and

sensing the value of the current of the second power signal from a second power MOSFET device coupled to the second converter.

28. A circuit board, comprising:

(a) a section of circuit board material;

(b) operating circuitry mounted to the section of circuit board material; and

(c) a converter that includes:

(i) switched capacitor circuitry that electrically connects with a voltage reference and a ground reference in an alternating manner to provide a power signal to the operating circuitry, the power signal having an output voltage value that is between a voltage reference value of the voltage reference and a ground reference value of the ground reference,

(ii) an overvoltage protection switch interconnected between the switched capacitor circuitry and the voltage reference, and

(iii) a control circuit coupled to the switched capacitor circuitry and the overvoltage protection switch, the control circuit being configured to open the overvoltage protection switch when the output voltage value exceeds a predetermined threshold.

29. A converter, comprising:

switched capacitor circuitry that electrically connects with a voltage reference and a ground reference in an alternating manner to provide a power signal having an output voltage value that is between a voltage reference value of the voltage reference and a ground reference value of the ground reference;

an overvoltage protection switch interconnected between the switched capacitor circuitry and the voltage reference; and

a control circuit coupled to the switched capacitor circuitry and the overvoltage protection switch, the control circuit being configured to open the overvoltage protection switch when the output voltage value exceeds a predetermined threshold.

30. A method for providing a power signal to operating circuitry mounted on a circuit board, the method comprising the steps of:

electrically connecting a power storage device with a voltage reference and a ground reference in an alternating manner to provide a power signal having an output voltage value that is between a voltage reference value of the voltage reference and a ground reference value of the ground reference;

comparing the output voltage value of the power signal to a predetermined threshold; and

opening an overvoltage protection switch interconnected between the power storage device and the voltage reference when the output voltage value exceeds the predetermined threshold.

31. A circuit board, comprising:

(a) a section of circuit board material;

(b) operating circuitry mounted to the section of circuit board material; and

(c) a converter system that includes:

(i) a converter to receive an input power signal and provide an output power signal,

(ii) a control register, and

(iii) a controller coupled to the converter and to the control register, the controller being configured to selectively direct the converter to provide:

(A) the output power signal with a regulated voltage value regardless of a value of the input power signal when the control register stores a first control value, and

(B) the output power signal with a margined voltage value based on the value of the input power signal when the control register stores a second control value that is different than the first control value.

32. A converter system, comprising:

a converter to receive an input power signal and provide an output power signal;

a control register; and

a controller coupled to the converter and to the control register, the controller being configured to selectively direct the converter to provide (i) the output power signal with a regulated voltage value regardless of a value of the input power signal when the control register stores a first control value, and (ii) the output power signal with a margined voltage value based on the value of the input power signal when the control register stores a second control value that is different than the first control value.

33. A method for providing a power signal to operating circuitry mounted on a circuit board, the method comprising the steps of:

storing one of a first control value and a second control value that is different than the first control value in a control register;

receiving an input power signal;

providing an output power signal, the output power signal having (i) a regulated voltage value regardless of a value of the input power signal when the control register stores the first control value, and (ii) a margined voltage value based on the value of the input power signal when the control register stores the second control value that is different than the first control value.